

06/13/00

Jc14 U.S. PTO

Case Docket No. 60,130-709

Date: June 13, 2000

BOX PATENT APPLICATION
 Assistant Commissioner of Patents
 Washington, D. C. 20231

Sir:

Transmitted herewith for filing is a Patent Application of:

Inventor(s): Rainer Grimm, et al.

For : **CRUMPLE ZONE FOR BODY PANELS**

Enclosed are:

- ☒ 10 Page patent application.
☒ 3 Sheets of drawings -- ☒ Formal, ☐ Informal
☒ An Assignment of the invention to Meritor Light Vehicle Technology, L.L.C.
☒ A Combined Declaration and Power of Attorney.
☐ A Verified Statement By Assignee Claiming Small Entity Status
☐ An Associate Power of Attorney
☐ A Preliminary Amendment.
☐ Information Disclosure Statement and PTO Form 1449 with copies of cited patents
 This application is a Continuation-in-Part of U.S. Patent Application Serial No. _____, filed on _____, which in turn claims priority to U.S. Provisional Patent Application Serial No. _____, filed on _____.

The filing fee has been calculated as shown below:

	No. Filed	No. Extra	Small Entity		Large Entity	
Basic Fee						\$ 690.00
Total Claims	14-20	-0-	@ \$ 9	-0-	@ \$ 18.00	-0-
Indep. Claims	1-3	-0-	@ 39	-0-	@ \$ 78.00	-0-
Multiple Depend. Claim(s) Present <u>-0-</u> \$ 260.00						
TOTAL \$ -0-				TOTAL \$ 690.00		

- ☐ Please charge my Deposit Account No. 08-2789 in the amount of \$ -0-.
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☒ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 08-2789. A duplicate copy of this sheet is enclosed.
☒ Any additional filing fees required under 37 CFR § 1.16.
☒ Any patent application processing fees under 37 CFR § 1.17.

Respectfully Submitted,

HOWARD & HOWARD

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CERTIFICATE OF MAILING BY AEXPRESS MAIL

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Christine M. Wolfe
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CRUMPLE ZONE FOR BODY PANELS

BACKGROUND OF THE INVENTION

This invention relates to vehicle body panels that crumple in a predisposed manner when impacted.

Body panels are used on vehicles to define the structure of the vehicle and create the design lines of the vehicle. Vehicle body panels also offer, to some extent, protection for the machinery under the hood and the occupants inside.

Currently, vehicle body panels are typically made from metallic panels. There are several disadvantages to using these known metallic panels. One disadvantage is that metallic panels can be harmful to pedestrians if there is a collision between a pedestrian and a vehicle. Another disadvantage of metallic panels is that they require painting. Further, metallic panels are expensive to manufacture.

Therefore, there is a need for a vehicle body panel that is less expensive to manufacture, does not require painting, and that is structurally sound yet crumples in a predetermined fashion to reduce the risk to a pedestrian in the case of an accident.

SUMMARY OF THE INVENTION

The vehicle body panel of the present invention overcomes the above problems of standard vehicle body panels made from sheet metal. In general terms, this invention discloses a vehicle body panel that will crumple in a predisposed manner upon impact. The panel includes a sheet of pre-painted or paintless material and preferably polymeric material that is reinforced at spaced locations.

There are various embodiments for reinforcing the sheet of material. Preferably, the sheet

of polymeric material is reinforced with reinforcing fibers that are arranged in a predetermined manner. For instance, the reinforcing fibers could be arranged in spaced rows. In an alternative embodiment, the sheet of material is reinforced with spaced mechanical ribs. In another alternative embodiment, the sheet is reinforced with alternating sections of a rigid material and a less rigid material. For instance, the rigid material might be a high density polymeric foam and the less rigid material might be a low density polymeric foam. In yet another alternative embodiment, the sheet is reinforced with spaced metal inserts. Preferably, the metal inserts are directly molded into the component.

All of the embodiments described above can also include a sheet of colored material. The sheet of colored material is preferably a paintless film or alternatively pre-painted aluminum. The paintless film is preferably a thermoplastic material with molded-in color. If the sheet of colored material is used, the panel will not need to be painted.

There are several advantages to using these body panels in vehicles. These body panels are advantageous because they crumple in a predisposed manner and are, therefore, less harmful to pedestrians if there is a collision between the vehicle and a pedestrian. It is less expensive to produce body panels as described above compared to the cost to produce metallic body panels. Another advantage of the reinforced body panels is low weight compared to metallic body panels.

These and other features of the invention may be best understood from the following specification and drawings. The following is a brief description of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of the device of the present invention installed on a vehicle.

Figure 2 is a perspective view of the preferred embodiment.

Figure 3A is a perspective view of an alternative embodiment showing the side of the vehicle body panel facing the exterior of the vehicle.

Figure 3B is a perspective view of an alternative embodiment showing the side of the vehicle body panel not facing the exterior of the vehicle.

Figure 4 is a perspective view of an alternative embodiment showing the side of the vehicle body panel not facing the exterior of the vehicle.

Figure 5 is a perspective view of an alternative embodiment showing the side of the vehicle body panel not facing the exterior of the vehicle.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 illustrates a vehicle body panel, shown generally at 20, attached to a vehicle 22.

The panel 20 is shown used as the hood of the vehicle in Figure 1, but is not just limited to this position. For instance, body panels of the present invention can also be used as front panels on the sides of a vehicle. Indeed, the inventive panels can be used in any exterior vehicle panel location.

The preferred embodiment, as shown in Figure 2, includes a sheet of polymeric material 24 that is reinforced with spaced reinforcing fibers 26. Preferably, the reinforcing fibers 26 are arranged in a predetermined pattern. For example, the reinforcing fibers could be positioned in

spaced rows. Another way of describing the panel is that the panel includes predetermined areas with high concentrations 28 of reinforcing fibers 26 and areas with low concentrations 30 or no reinforcing fibers 26. The concentration areas 28, 30 in the panel are strategically located to allow the panel 24 to crumple in a predetermined manner upon impact. Alternatively, the orientation of the reinforcing fibers can be positioned in an alternating fashion so that the panel will crumple in a predetermined manner when impacted.

Further, the panel 24 may additionally include a sheet of colored material 32 attached to the sheet of reinforced polymeric material 24. Preferably, the sheet of colored material 32 is molded to the reinforced polymeric material 24. No painting of the component is required when the sheet of colored material 32 is used. The sheet of colored material 32 is preferably a paintless film or alternatively pre-painted aluminum.

An alternative embodiment of the vehicle body panel, shown in Figures 3A and 3B, includes polymeric material 34 that is reinforced with spaced mechanical ribs 36. The mechanical ribs 36 are preferably molded into the polymeric material 34 during the molding process. Preferably, the polymeric material 34 is a sheet. The ribs 36 face inward when the panel is mounted on a vehicle. Further, the mechanical ribs are positioned so that the panel 34 will crumple in a predetermined manner when impacted. A sheet of colored material 32 may also be attached to the polymeric material 34 that is reinforced with mechanical ribs 36. Preferably, the sheet of colored material 32 is molded to the polymeric material 34.

Another alternative embodiment of the vehicle body panel 38 is shown in Figure 4. This embodiment of the panel 38 includes alternating sections of a rigid material 40 and a less rigid material 42. The less rigid material 42 is less rigid relative to the rigid material 40. Preferably, the rigid material 40 is made from a high density polymeric foam and the less rigid material 42 is

made from a low density polymeric foam. The sections of foam 40, 42 are preferably arranged in rows. The sections 40, 42 are arranged so that the body panel 38 will crumple in a predetermined manner when impacted. For instance, if the body panel is impacted, the sections of low density polymeric foam 42 will yield before the sections of high density polymeric foam 40. Further, a sheet of colored material 32 can be attached to the alternating layers of high and low density foam 40, 42 so that the panel 38 does not need to be painted. The sheet of colored material 32 is preferably molded to the alternating layers of high and low density polymeric foam 40, 42. Again, material 32 faces outwardly when mounted on a vehicle.

Yet another alternative embodiment of the vehicle body panel 44 is shown in Figure 5. The vehicle body panel 44 is made from a polymeric material 46 that is reinforced with spaced metal inserts 48. Preferably, the polymeric material 46 is a polymeric foam. The metal inserts 48 are preferably notched 50 so that they will deform in a predetermined manner under impact. The metal inserts 48 are preferably molded into the polymeric foam material 46. A sheet of colored material 32 can also be attached to the polymeric foam material 46 that is periodically reinforced with metal inserts 48 so that the body panel 44 does not need to be painted.

Alternatively, any of the four embodiments can be combined to form a vehicle body panel 20.

The invention has been described in an illustrative manner, and it is to be understood that the terminology that has been used is intended to be in the nature of words of description rather than of limitation. Modifications and variations of the examples described above are possible and it must be understood that such changes may be within the scope of the following claims. In other words, the invention may be practiced otherwise than as specifically described above.

CLAIMS

What is claimed is:

1. A vehicle body panel comprising:
a sheet of material; and
spaced reinforcement on said panel such that said panel crumples in a predetermined manner.
2. The body panel of claim 1 wherein said sheet is made from a polymer.
3. The body panel of claim 1 further comprising a sheet of colored material attached to said sheet of material.
4. The body panel of claim 3 wherein said sheet of material is reinforced with spaced reinforcing fibers.
5. The body panel of claim 3 wherein said sheet of material is reinforced with spaced ribs.
6. The body panel of claim 3 wherein said sheet comprises alternating sections of a rigid polymeric material and a less rigid polymeric material.
7. The body panel of claim 6 wherein said rigid polymeric material is a high density polymeric foam and said less rigid polymeric material is a low density polymeric foam.

8. The body panel of claim 3 wherein said sheet is made from polymeric foam and is reinforced with spaced metal inserts.
9. The body panel of claim 8 wherein said metal inserts are notched.
10. The body panel of claim 3 wherein said sheet of colored material is a paintless film.
11. The body panel of claim 3 wherein said sheet of colored material is a pre-painted aluminum.

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12. A vehicle body panel comprising:
a polymeric material reinforced with spaced ribs on one side; and
a colored material attached to an opposed side of said polymeric material.
13. The body panel of claim 12 wherein said sheet of polymeric material and said ribs are a single molded component.

14. A vehicle body panel comprising:
a polymeric material reinforced with a spaced reinforcing material on one side; and
a colored material attached to an opposed side of said reinforced polymeric material.
15. The body panel of claim 14 wherein said reinforcing material comprises reinforcing fibers.
16. The body panel of claim 15 wherein said polymeric sheet is molded and said reinforcing fibers are molded into said sheet in spaced rows.
17. The body panel of claim 14 wherein said reinforcing material comprises metal inserts.
18. The body panel of claim 17 further having foam as part of said polymeric material and wherein said metal inserts are spaced and molded into said foam.
19. The body panel of claim 14 wherein said reinforcing material comprises alternating rows of a low density foam and a high density foam wherein said rows of low density foam and said rows of high density foam are attached to said polymeric material.

CRUMPLE ZONE FOR BODY PANELS**ABSTRACT OF THE DISCLOSURE**

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The body panels of the present invention are designed to crumple in a predisposed manner upon impact. The body panels are preferably made from a polymeric material. Further, the body panels can include a sheet of colored material attached to the polymeric material so that no painting of the panel is necessary. Preferably, the colored material is on an exterior surface of the panel. The colored material could be made from a thermoplastic with molded in color. The preferred embodiment of the present invention includes a polymeric material reinforced with spaced reinforcing fibers. An alternative embodiment of the body panel includes a sheet of polymeric material that is reinforced with spaced mechanical ribs that are preferably molded into the sheet of material. Another alternative embodiment of the body panel includes alternating sections of high density polymeric foam and low density polymeric foam. Yet another alternative embodiment of the body panel includes a sheet of foam material, preferably polymeric, that is reinforced with spaced metal inserts. The metal inserts are preferably notched to yield in a predetermined manner.

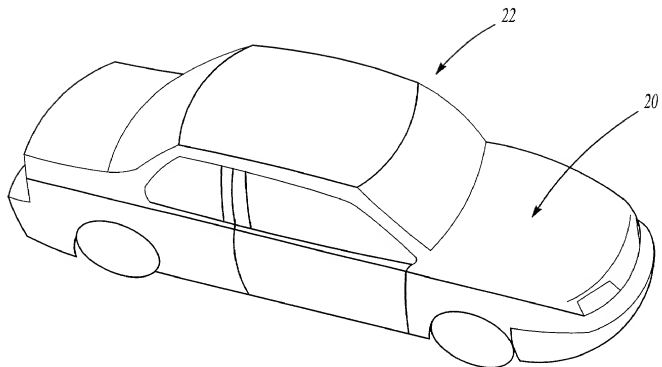


Fig-1

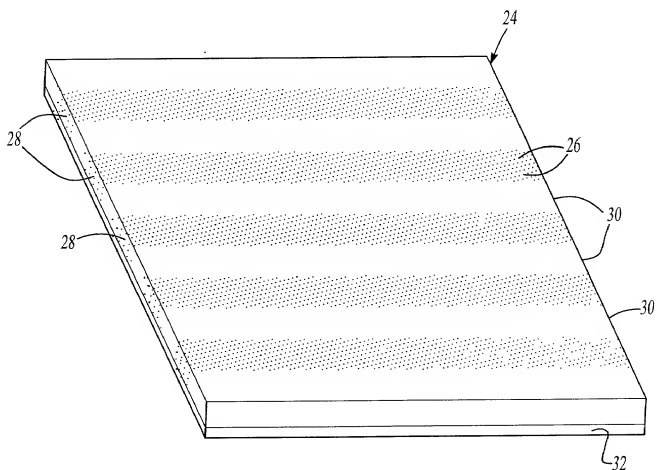


Fig-2

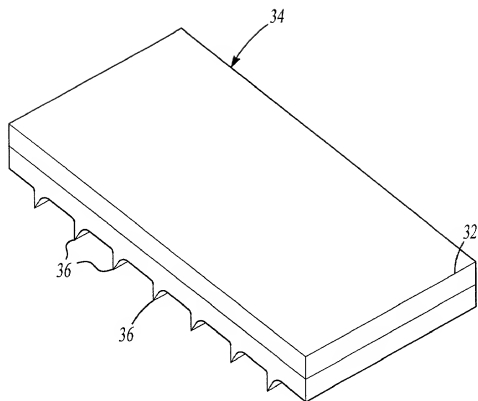


Fig-3A

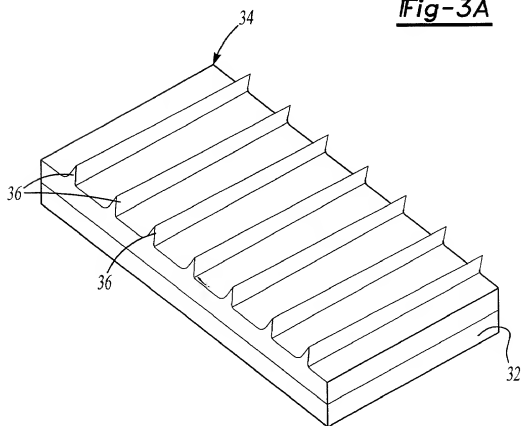


Fig-3B

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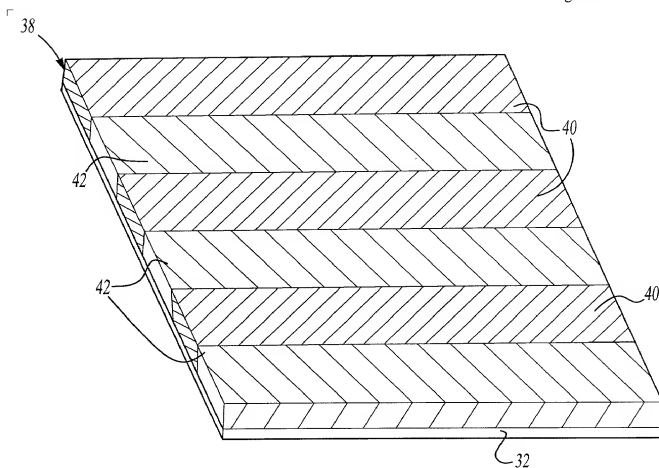


Fig-4

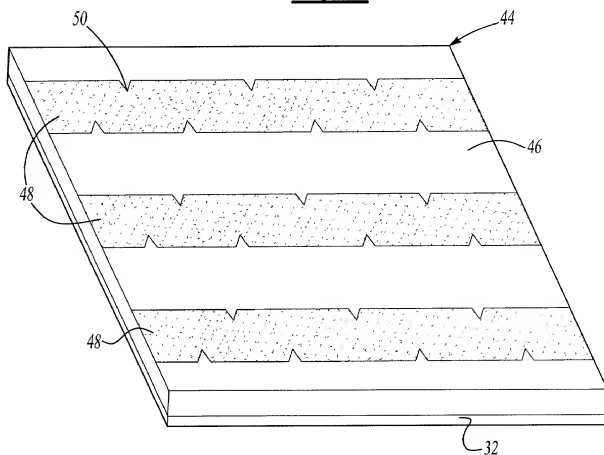


Fig-5

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COMBINED DECLARATION AND POWER OF ATTORNEY

As the below named inventors, we hereby declare: that our residences, post office addresses and citizenships are as stated near our names below; that we are joint inventors and we believe we are the original and first inventors of the subject matter of which is claimed and for which a patent is sought on the invention entitled

CRUMPLE ZONE FOR BODY PANELS

which is described and claimed in the attached specification and amended by an amendment thereto submitted therewith (if any); that we have reviewed and understand the contents of this specification, including the claims, as amended by any amendment referred to above; that we do not know and do not believe the same was ever known or used in the United States of America before our invention thereof or patented or described in any printed publication, in any country before our invention thereof for more than one year prior to this application, or in public use or on sale in the United States of America more than one year prior to this application; that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by us or our legal representatives or assigns more than twelve (12) months prior to this application; that we acknowledge our duty to disclose information of which we are aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a); and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by us or our legal representatives or assigns except as follows: NONE.

We hereby appoint Scott M. Confer, Registration No. 40,568; M. Lee Murrah, Registration No. 27,460; Theodore W. Olds, Registration No. 33,080; John E. Carlson, Registration No. 37,794; David J. Gaskey, Registration No. 37,139; Kerrie A. Laba, Registration No. 42,777; Randall L. Shoemaker, Registration No. 43,118; Samuel J. Haidle, Registration No. 42,619; William Gottschalk, Registration No. 44,130; William H. Honaker, Registration No. 31,623; Harold W. Milton, Jr., Registration No. 22,180; Jeffrey A. Sadowski, Registration No. 29,005 and Raymond E. Scott, Registration No. 22,981; Kevin MacKenzie, P45,639; David Wisz, P46,350; and David LaPrairie, P46,295 as our attorneys to prosecute this application and to transact all business in the Patent and Trademark Office and any foreign patent office connected herewith. Please address all correspondence and telephone calls to:

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We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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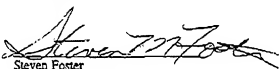
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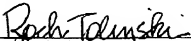
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